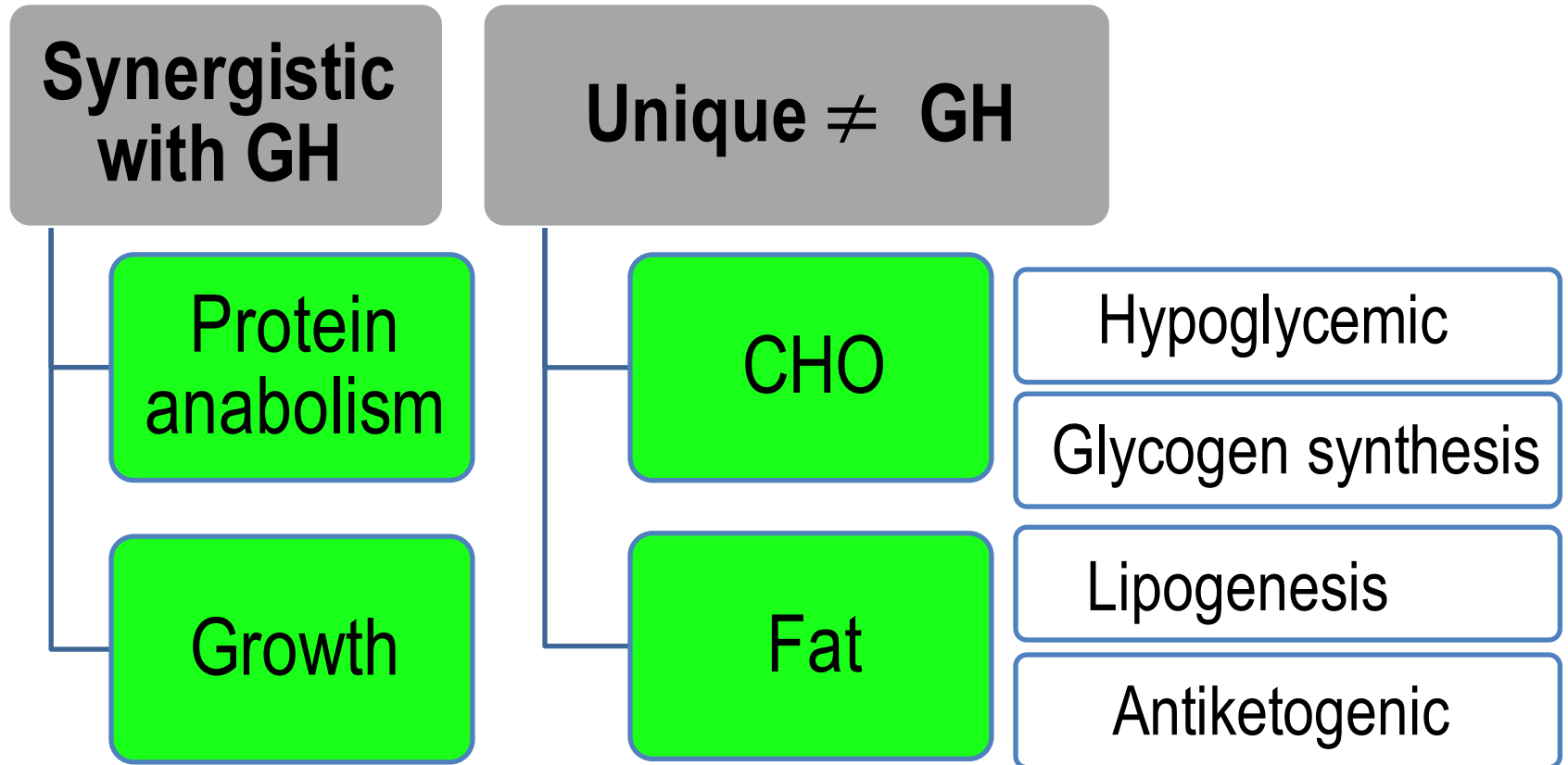


ACTIONS

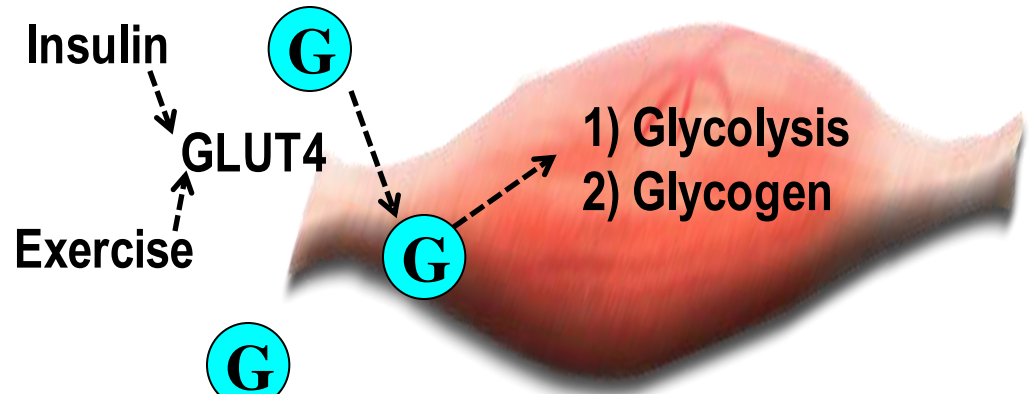
- ⊙ Anabolic
- ⊙ Hypoglycemic hormone



1) CHO Hypoglycemic

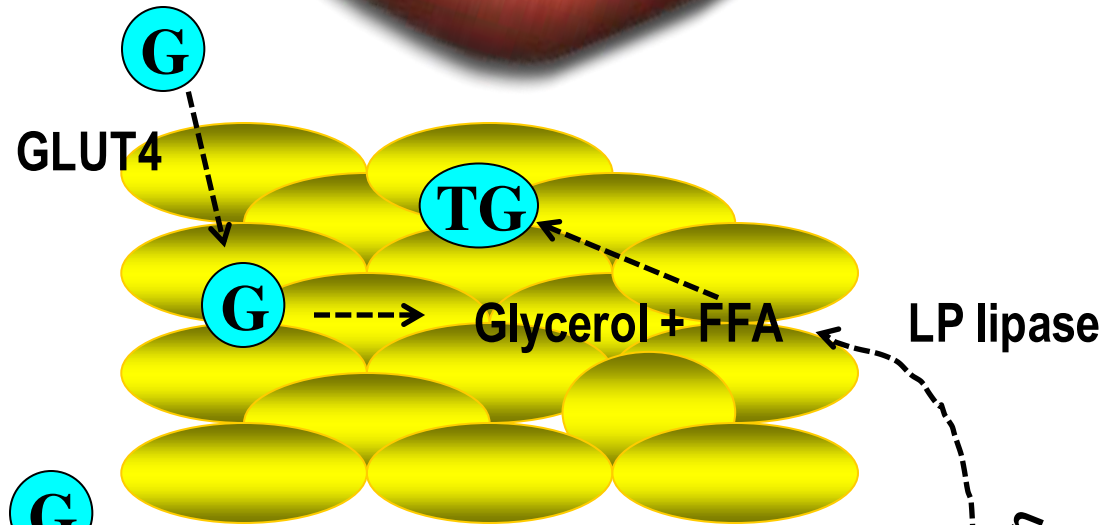
A. Muscle

- ↑Glucose uptake
- ↑Glycolysis
- ↑Glycogen storage



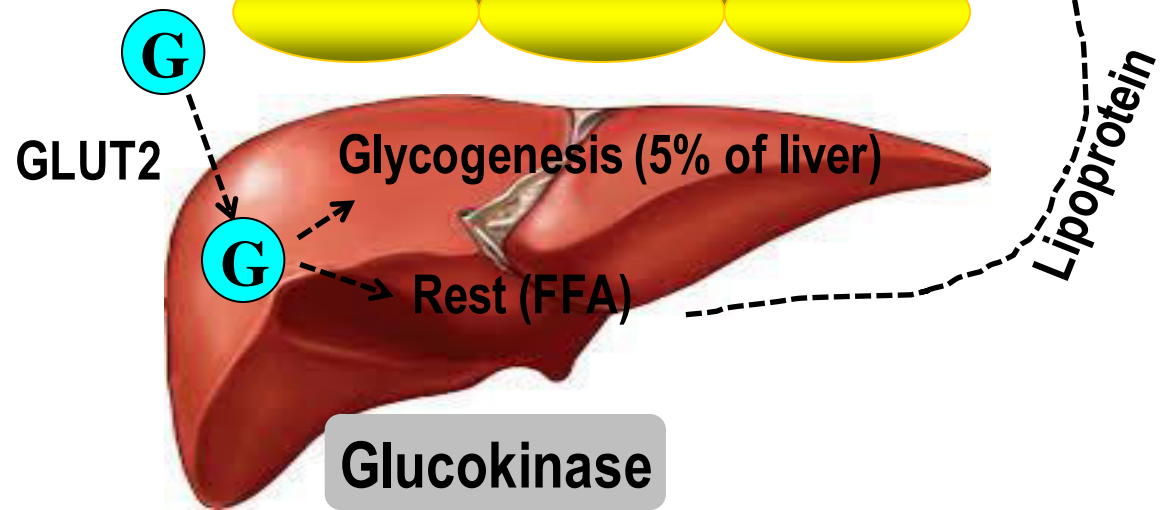
2. Adipose tissue

- ↑Lipoprotein lipase
- ↓Intracellular lipase



3. Liver

- ↑Glycogenesis
- ↓Glycogenolysis
- ↓Gluconeogenesis



2) Lipid Lipogenesis and antiketogenic:

(Related to CHO)

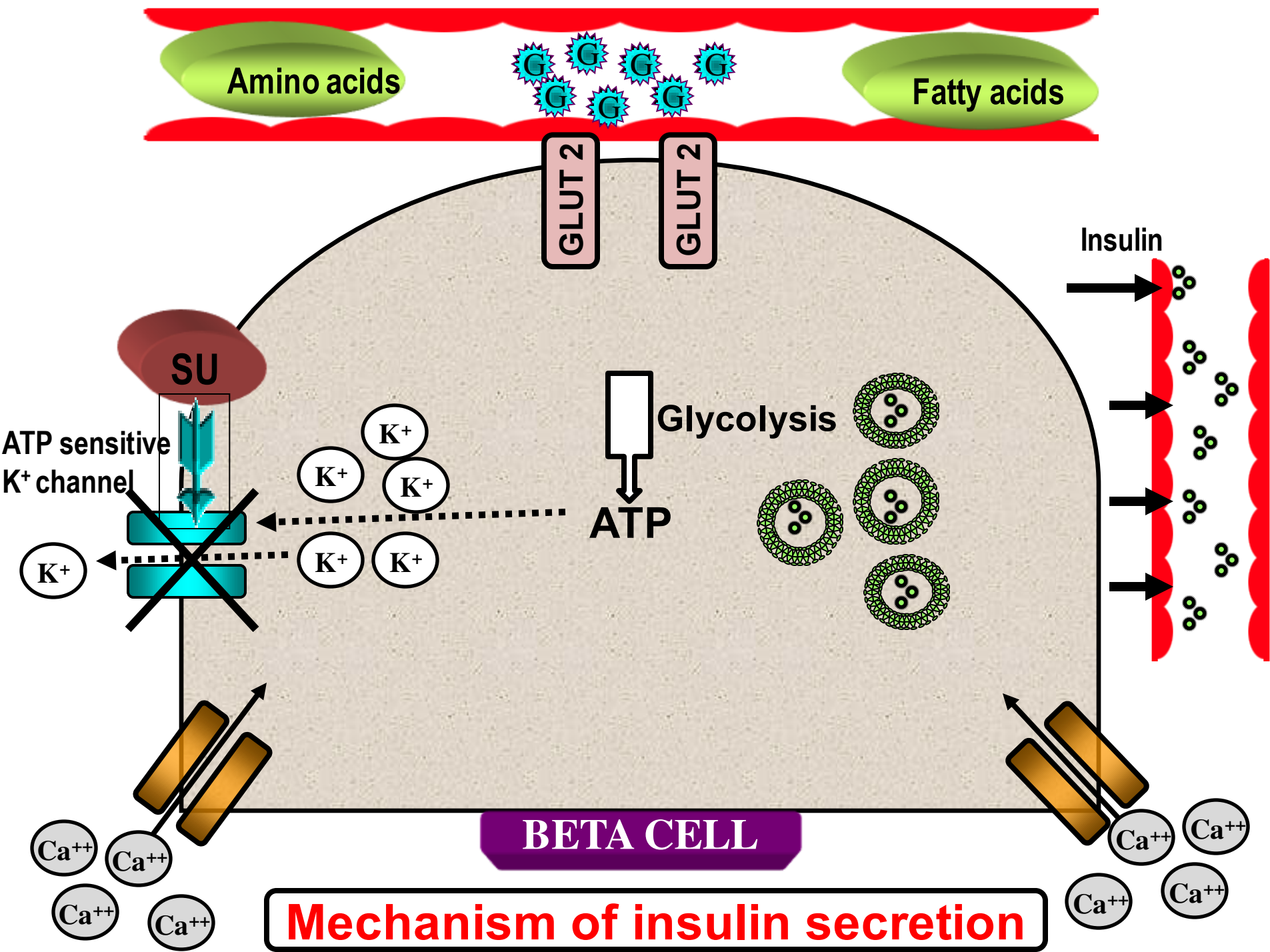
- ↑ Lipogenesis (liver & adipose tissue): Induce lipoprotein lipase (capillary wall) → split circulating TG → FA → adipose tissue
- ↓ Lipolysis (↓ intracellular lipase)
- Antiketogenic: ↓ oxidation of FA: ↑ Acetyl Co-A → Malonyl Co-A → inhibits carnithine acyltransferase (transport FA into mitochondria for oxidation to ketoacids)

3) Protein Anabolic

- ↑ Uptake of AA by cells
- ↑ Gene transcription in DNA and ↑ mRNA
- Inhibits catabolism of protein in muscle

4) Growth:

- GH and insulin are synergistic
- Diabetic animals fail to grow



FACTORS AFFECTING INSULIN SECRETION

1) ↑ Blood glucose

- ↑ Blood glucose more than fasting level is the main stimulus for insulin secretion

2) ↑ AA & FA

- Especially arginine, leucine and β ketoacids (ketoacetate) \rightarrow ↑ secretion

3) Plasma K^+

- $\downarrow K^+ \rightarrow \downarrow$ insulin (aldosteronism $\rightarrow \downarrow K^+ \rightarrow \downarrow$ insulin)
- Thiazide diuretics $\rightarrow \downarrow K^+ \rightarrow$ hyperglycemia

4) Plasma Ca^{2+}

- $\uparrow Ca^{2+} \rightarrow \uparrow$ insulin secretion

5) Intestinal hormones (incretins)

- Gastric inhibitory peptide (GIP) & glucagon like polypeptide (GLP) → ↑ secretion

6) Islets hormones

- Glucagon → ↑ secretion, somatostatin → ↓ secretion

7) Other hormones

- Glucocorticoids, GH, glucagon → ↑ secretion
- Leptin, somatostatin, insulin → ↓ secretion

8) ANS

- Parasympathetic → Ach → muscarinic receptors → ↑ secretion
- Sympathetic → Noradrenaline → α_2 receptors → ↓ secretion

9) Catecholamines

- α receptors → ↓ secretion
- β receptors → ↑ secretion

10) cAMP → ↑ secretion (due to ↑ intracellular Ca^{2+})

11) Drugs (oral hypoglycemic drug: sulphonylurea) → ↑ secretion

Insulin Deficiency

↓ Glucose Uptake

↑ Protein Catabolism

↑ Lipolysis

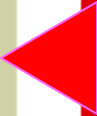
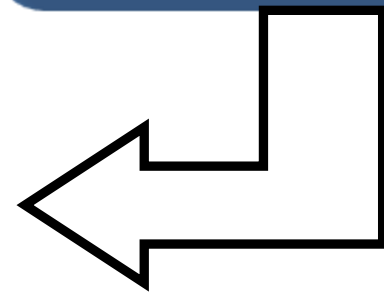
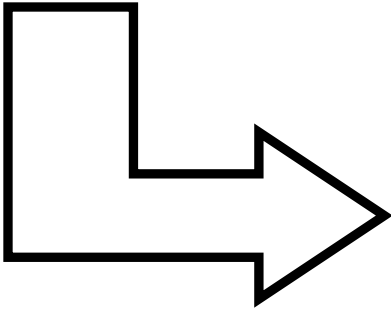
Hyperglycemia
Glycosuria
Osmotic diuresis
Electrolyte depletion

↑ Plasma AA

↑ Plasma FFA
Ketogenesis
Ketonemia
ketonuria

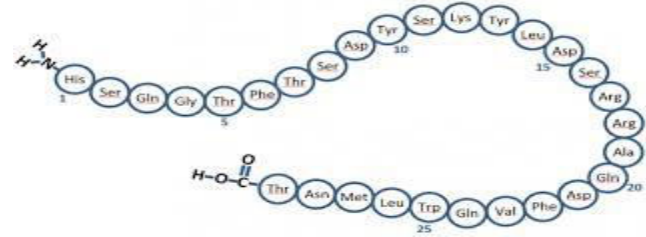
Dehydration
Acidosis

Coma & Death



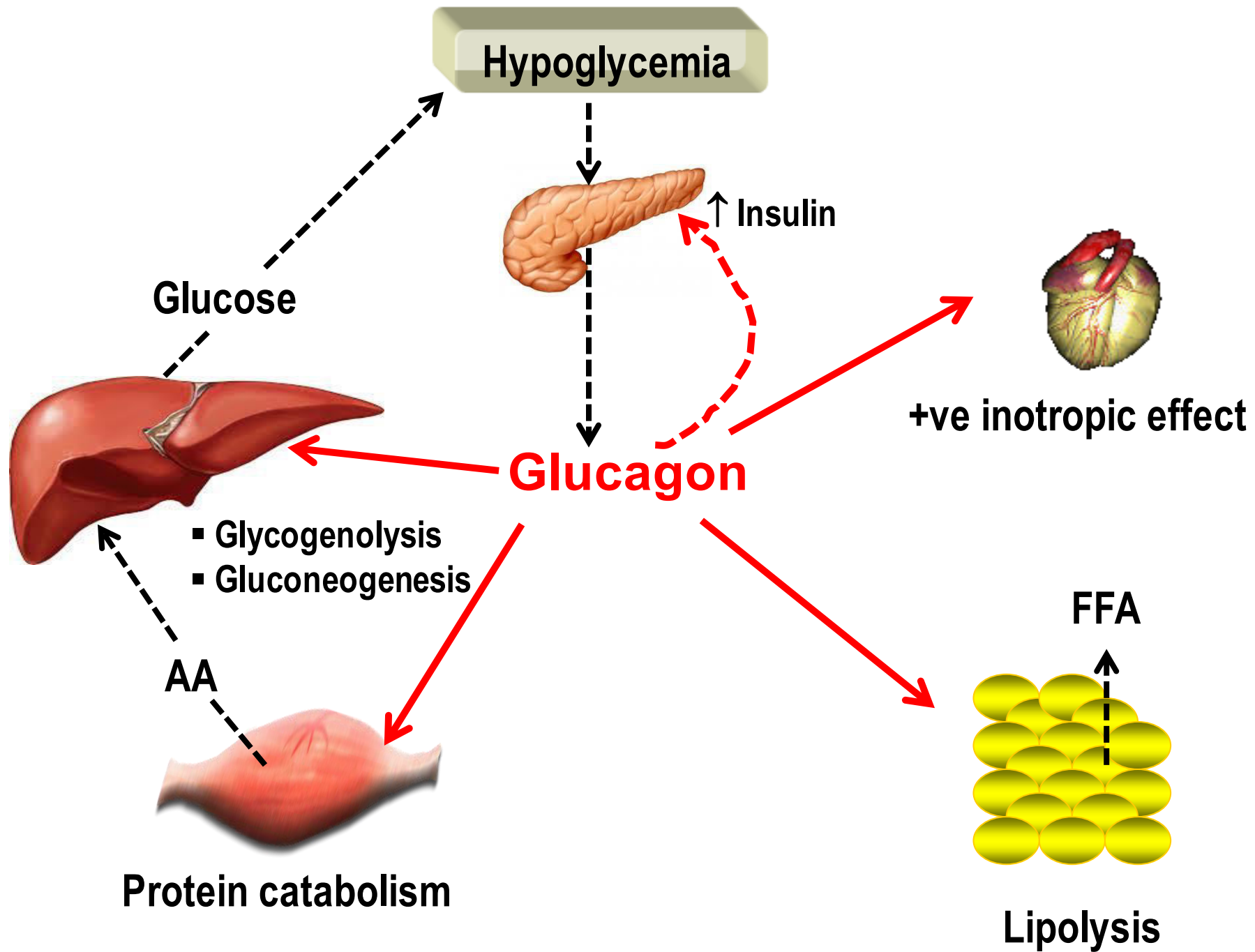
GLUCAGON 29AA

Hyperglycemic hormone



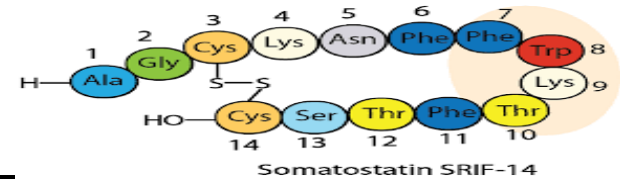
⦿ Action:

- **CHO:** Hyperglycemia
 - Glycogenolysis
 - Gluconeogenesis
- **Fat:** Lipolysis
- **Protein:** Catabolism (↑AA uptake by liver)
- **Heart:** +ve Inotropic effect
- **Insulin:** Stimulation of secretion



SOMATOSTATIN (GHIH)

Universal inhibitor



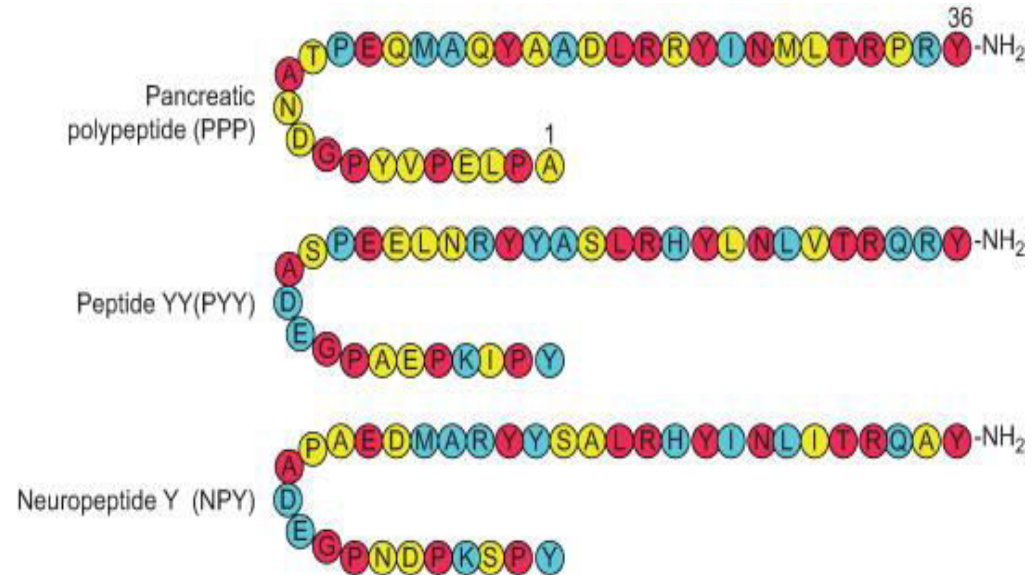
- Source:**
- Hypothalamus (CNS)
 - GIT: pyloric antrum, duodenum & pancreas

- Actions:**
- 1) ↓ Pituitary secretion of GH, TSH, & PRL
 - 2) GIT: Prevent rapid exhaustion of food
 - ↓ Pancreatic hormones (insulin, glucagon & ppp)
 - ↓ GIT hormones (gastrin, motilin, CCK & secretin)
 - ↓ Gastric HCl & pancreatic secretion
 - ↓ Gastric & intestinal motility & ↓ gastric emptying
 - ↓ Blood flow to GIT

Secretion is stimulated by ingestion of food via

- ↑ Blood glucose, AA & FFA
- ↑ GIT hormones (e.g. CCK)

PANCREATIC POLYPEPTIDE (36AA)



Source:

- ☉ Pancreas: γ (pp) cells: Closely related to other 36 AA polypeptide
 - Polypeptide YY (GI peptide)
 - Neuropeptide Y (brain & ANS)

Function

- ☉ Slows the absorption of food in humans